CLAIMS

What is claimed is:

1. (Currently amended) An electrical machine comprising:

a stator including a plurality of stator teeth and one or more windings with compact coils disposed around the teeth, the one or more windings having (m) phases and (p) poles,

where (m) is an integer and is greater than or equal to two,

where (p) is an integer, is greater than or equal to two, and is an even number; and

a rotor having a magnetization pattern including a magnetization skew of approximately $(2\pi/(mp))$.

2. (Original) The electrical machine of claim 1, wherein (t) is an integer and represents the number of stator teeth, wherein the stator teeth define a plurality of slots to receive the one or more windings, wherein each tooth includes a portion between two adjacent slots, the portion having a width (w_t), and wherein the stator further includes a back iron having a radial width (w_y) that satisfies the relationship $(1.5\ (t/(2p))\ (w_t)) \leq (w_y) \leq (4.5\ (t/(2p))\ (w_t))$.

3. (Original) The electrical machine of claim 2, wherein the one or more windings include an arrangement for the coils, and wherein the number of phases (m) and poles (p) has a relation to the arrangement.

4. (Original) The electrical machine of claim 1, wherein $(m=2k+1)$ and $(p=2j)$, where (k) and (j) are integers greater than or equal to one, and wherein the free end of each stator tooth includes two channels along a surface adjacent to the rotor.

5. (Original) The electrical machine of claim 4, wherein each channel has a substantially trapezoidal shape.

6. (Original) The electrical machine of claim 4, wherein each channel has a substantially curvilinear shape.

7. (Original) An electrical machine comprising:

a shaft rotatable about an axis;

a rotor coupled to the shaft and rotating with the shaft; and

a stator including a plurality of stator teeth, each stator tooth including a channel along a surface adjacent to the rotor, each channel having a substantially trapezoidal shape.

8. (Original) The electrical machine of claim 7, wherein the trapezoidal shape of each channel includes an opening adjacent to the rotor, the opening having an opening width (w_b), a base at a depth from the surface, the base having a base width (w_n), and a pair of sides at a side angle (α) with respect to the base.

9. (Original) The electrical machine of claim 8, wherein the stator defines a plurality of slot openings between each stator tooth, each slot opening having a width (w_o).

10. (Original) The electrical machine of claim 9, wherein the slot openings having a height opening (h_o).

11. (Original) The electrical machine of claim 9, wherein (w_n) satisfies the relationship $(0.5w_o) \leq (w_n) \leq (1.5w_o)$.

12. (Original) The electrical machine of claim 9, wherein (w_b) satisfies the relationship $(0.3w_o) \leq (w_b) \leq (1.2w_o)$.

13. (Original) The electrical machine of claim 9, wherein (α) satisfies the relationship $(30°) \leq (\alpha) \leq (135°)$.

14. (Original) The electrical machine of claim 9, wherein (w_n) satisfies the relationship $(0.5w_o) \leq (w_n) \leq (1.5w_o)$, wherein ($w_b$) satisfies the relationship $(0.3w_o) \leq (w_b) \leq (1.2w_o)$, and wherein ($\alpha$) satisfies the relationship $(30°) \leq (\alpha) \leq (135°)$.

15. (Original) The electrical machine of claim 9, wherein each stator tooth includes a second channel along a surface adjacent to the rotor, wherein each second channel includes a substantially trapezoidal shape.

16. (Original) The electrical machine of claim 15, wherein (w_n) satisfies the relationship ($0.5w_o$) $\leq$(w_n) $\leq$($1.5w_o$).

17. (Original) The electrical machine of claim 15, wherein (w_b) satisfies the relationship ($0.3w_o$) $\leq$(w_b) $\leq$($1.2w_o$).

18. (Original) The electrical machine of claim 15, wherein (α) satisfies the relationship ($30°$) $\leq$(α) $\leq$($90°$).

19. (Original) The electrical machine of claim 15, wherein (w_n) satisfies the relationship ($0.5w_o$) $\leq$(w_n) $\leq$($1.5w_o$), wherein (w_b) satisfies the relationship ($0.3w_o$) $\leq$(w_b) $\leq$($1.2w_o$), and wherein (α) satisfies the relationship ($30°$) $\leq$(α) $\leq$($135°$).

20. (Original) An electrical machine comprising:

a shaft rotatable about an axis;

a rotor coupled to the shaft and rotating with the shaft; and

a stator including a plurality of stator teeth, each stator tooth including first and second channels along a surface adjacent to the rotor, each channel having a substantially trapezoidal shape.

21. (Original) The electrical machine of claim 20, wherein the trapezoidal shape of each channel includes an opening adjacent to the rotor, the opening having an opening width (w_b), a base at a depth from the surface, the base having a base width (w_n), a first side at a side angle (α) with respect to the base, and a second side at a side angle (γ) with respect to the base.

22. (Original) The electrical machine of claim 21, wherein the stator defines a plurality of slot openings between each stator tooth, each slot opening having a width (w_o).

23. (Original) The electrical machine of claim 22, wherein (w_n) satisfies the relationship $(0.5w_o) \leq (w_n) \leq (1.5w_o)$.

24. (Original) The electrical machine of claim 23, wherein (w_b) satisfies the relationship $(0.3w_o) \leq (w_b) \leq (1.2w_o)$.

25. (Original) The electrical machine of claim 23, wherein (α) satisfies the relationship $(30°) \leq (\alpha) \leq (90°)$ and wherein (γ) satisfies the relationship $(30°) \leq (\gamma) \leq (90°)$.

26. (Original) The electrical machine of claim 23, wherein (w_n) satisfies the relationship $(0.5w_o) \leq (w_n) \leq (1.5w_o)$, wherein ($w_b$) satisfies the relationship $(0.3w_o) \leq (w_b) \leq (1.2w_o)$, and wherein ($\alpha$) satisfies the relationship $(30°) \leq (\alpha) \leq (135°)$.

27. (Original) An electrical machine comprising:

a shaft rotatable about an axis;

a rotor coupled to the shaft and rotating with the shaft; and

a stator including a plurality of stator teeth, each of the plurality of stator teeth having a free end adjacent to a rotor; and

first and second channels located at the free end of each of the plurality of stator teeth, the first and second channels having a substantially curvilinear shape.

28. (Original) The electrical machine of claim 27, wherein each channel includes an opening having an opening width (w_o).

29. (Original) The electrical machine of claim 28, wherein the stator defines a plurality of slot openings between each stator tooth, each slot opening having a width (w_o).

30. (Original) The electrical machine of claim 28, wherein each curvilinear shape has a centerline, and wherein each curvilinear shape follows an arc of a circle with a center on the centerline.

31. (Original) The electrical machine of claim 30, wherein the circle has a diameter (d) that satisfies the relationship $((0.75w_o) \leq (d) \leq (1.5w_o))$.

32. (New) A method of manufacturing an electrical machine:

producing a stator having a plurality of stator teeth and one or more windings with coils disposed on the teeth, the one or more windings including (m) phases and (p) poles, where (m) is an integer and is greater than or equal to two, and where (p) is an integer, is greater than or equal to two, and is an even number;

producing a rotor including magnetizing the rotor to have a magnetization pattern comprising a magnetization skew of approximately $(2\pi/(mp))$; and

assembling the machine.

33. (New) The method of claim 32, wherein producing the stator includes forming a first and a second lamination, each of the first and second laminations including (t) stator teeth defining (t) slots where (t) is an integer, each tooth including a portion between two adjacent slots, the portion having a width (w_t), and each of the first and second laminations including a back iron having a radial width (w_y) that satisfies the relationship $(1.5\ (t/(2p))\ (w_t)) \leq (w_y) \leq (4.5\ (t/(2p))\ (w_t))$, and wherein producing the stator further includes forming a stator core, the formation of the stator core including coupling the first and second laminations.

34. (New) The method of claim 33, wherein producing the stator includes creating a channel in the free end of each tooth, and wherein producing the stator further includes disposing the one or more windings on the core, where the number of phases (m) and poles (p) satisfy the relationships $(m=2k+1)$ and $(p=2j)$ where (k) and (j) are integers greater than or equal to one.